

What is claimed is:

1. A data embedding device for embedding objective data to be embedded in a speech code obtained by encoding a speech in accordance with a speech encoding method based on a voice generation process of a human being, comprising:

an embedding judgment unit, every speech code, to judge whether or not data should be embedded in the speech code ; and

an embedding unit to embed data should be embedded in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes constituting the speech code for which it is judged by the embedding judgment unit that the data should be embedded.

2. The data embedding device according to claim 1, wherein the embedding judgment unit, for every frame defined in accordance with the speech encoding method, judges whether the frame is a frame of a speech section, or a frame of a non-speech section, and the embedding unit executes a process for embedding data in a speech code of the frame judged to be the frame of a non-speech section.

3. A data extraction device for extracting data embedded in a speech code, comprising:

an extraction judgment unit to, every speech code, judge

whether or not data is being embedded in the speech code; and

an extraction unit to extract data being embedded in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes constituting the speech code for which it is judged by the extraction judgment unit that data is being embedded.

4. The data extraction device according to claim 3, wherein the extraction judgment unit, for every frame defined in accordance with a speech encoding method of the speech code, judges whether the frame is a frame of a speech section, or a frame of a non-speech section, and the extraction unit executes a process for extracting data from the speech code of the frame judged to be the frame of a non-speech section.

5. A data embedding/extraction device for executing a process for embedding data in a speech code and a process for extracting embedded data from the speech code, comprising:

an embedding judgment unit to, every speech code, judge whether or not data should be embedded in the speech code;

an embedding unit to embed data in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes constituting the speech code for which it is judged by the embedding judgment unit that the data should be embedded;

an extraction judgment unit to, every speech code, judge whether or not data is being embedded in the speech code; and

an extraction unit to extract data being embedded in two or more parameter codes, defined as embedding object codes, of a plurality of parameter codes constituting the speech code for which it is judged by the extraction judgment unit that data is being embedded.

6. A data embedding method for embedding data in a speech code, comprising:

judging whether or not data should be embedded in the speech code; and

embedding data in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes constituting the speech code for which it is judged that data should be embedded.

7. The data embedding method according to claim 6, further comprising, for every frame defined in accordance with a speech encoding method of the speech code, judging whether the frame is a frame of a speech section, or a frame of a non-speech section, and executing a process for embedding data in the speech code of the frame judged to be the frame of a non-speech section.

8. A data extraction method for extracting embedded data from a speech code, comprising:

judging whether or not data is being embedded in the speech code; and

extracting data being embedded in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes constituting the speech code of the frame for which it is judged that data is being embedded.

9. The data extraction method according to claim 8, further comprising, for every frame defined in accordance with the speech encoding method of the speech encode, judging whether the frame is a frame of a speech section, or a frame of a non-speech section, and executing a process for embedding data in the speech code of the frame judged to be the frame of a non-speech section.

10. A data embedding/extraction method with respect to a speech code obtained by encoding a speech in accordance with a speech encoding method based on a voice generation process of a human being, comprising:

judging, for every speech code, whether or not data should be embedded in the speech code;

embedding data in two or more parameter codes, defined as embedding object parameter codes, of a plurality of parameter codes

constituting the speech code for which it is judged that the data should be embedded;

judging, for every speech code, whether or not data is being embedded in the speech code; and

extracting data being embedded in two or more parameter codes, defined as embedding object codes, of a plurality of parameter codes constituting the speech code for which it is judged that data is being embedded.

11. A data transmission device, comprising:

a generation unit to generate error detection data for embedded data;

an embedding unit to embed the embedded data and the error detection data in other data; and

a unit to transmit the other data to a data reception device through a network.

12. A data extraction device, comprising:

a unit to extract embedded data and error detection for the embedded data, which are embedded in data, received from a data transmission device through a network;

a checking unit to check whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

a unit, when it is judged as a result of the check by the checking unit that there is no error in the embedded data, outputting the embedded data, and outputting, when it is judged as a result of the check by the checking unit that there is an error in the embedded data, data for transmitting a resending request of the embedded data to the data transmission device.

13. A data extraction device, comprising:

a unit to extract embedded data and error detection data for the embedded data that are embedded in data received from a data transmission device through a network;

a restoration unit to restore a data block containing therein data as an object for embedding, and data for error detection;

a checking unit to check whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

an unit, when it is judged as a result of the check by the checking unit that there is no error in the embedded data, outputting the embedded data, and, when it is judged as a result of the check by the checking unit that there is an error in the embedded data, outputting data for transmitting a resending request of the embedded data to the data transmission device.

14. A data extraction device, comprising:

an extraction unit to extract a first data block embedded in data received from a data transmission device through a network;

a restoration unit to combine a plurality of first data blocks extracted by the extraction unit to restore a second data block including therein embedded data and error detection data for the embedded data;

a checking unit to check whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

an unit, when it is judged as a result of the check by the checking unit that there is no error in the embedded data, outputting the embedded data, and, when it is judged as a result of the check by the checking unit that there is an error in the embedded data, outputting data for transmitting a resending request of the embedded data to the data transmission device.

15. A data reception device, comprising:

a unit to receive data from a data transmission device through a network;

a unit to extract embedded data and error detection data for the embedded data which are embedded in data received from a data transmission device through a network;

a checking unit to check whether there is an error in the embedded data or not by use of the embedded data and the error detection

data; and

a unit, when it is judged as a result of the check by the checking unit that there is no error in the embedded data, outputting the embedded data, and, when it is judged as a result of the check by the checking unit that there is an error in the embedded data, outputting data for transmitting a resending request of the embedded data to the data transmission device.

16. A communication device, comprising:

a generation unit to generate error detection data for embedded data;

an embedding unit to embed the embedded data and the error detection data in other data;

a unit to transmit the other data to a data reception device through a network;

a unit to receive data from a data transmission device through the network;

a unit to extract embedded data and error detection data for the embedded data that are embedded in the received data;

a checking unit to check whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

a unit, when it is judged as a result of the check by the checking unit that there is no error in the embedded data, outputting the



embedded data, and, when it is judged as a result of the check by the checking unit that there is an error in the embedded data, outputting data for transmitting a resending request of the embedded data to the data transmission device,

wherein the embedding unit receives the data for transmitting the resending request to embed a predetermined resending request in other data transmitting to the data reception device.

17. A data extraction method, comprising:

extracting embedded data and error detection data for the embedded data, which are embedded in data received from a data transmission device through a network;

checking whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

outputting, when it is judged as a result of the check that there is no error in the embedded data, the embedded data, and outputting, when it is judged as a result of the check that there is an error in the embedded data, data for transmitting a resending request of the embedded data to the data transmission device.

18. A data extracting method, comprising:

extracting embedded data and error detection data for the embedded data that are embedded in data received from a data transmission device through a network;

restoring a data block including therein the embedded data and the error detection data;

checking whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

outputting, when it is judged as a result of the check that there is no error in the embedded data, the embedded data, and outputting, when it is judged as a result of the check that there is an error in the embedded data, data for transmitting a resending request of the embedded data to the data transmission device.

19. A data extracting method, comprising:

extracting a first data block embedded in data received from a data transmission device through a network;

combining a plurality of first data blocks extracted by the extracting operation to restore a second data block including therein embedded data and error detection data for the embedded data;

checking whether there is an error in the embedded data or not by use of the embedded data and the error detection data; and

outputting, when it is judged as a result of the check that there is no error in the embedded data, the embedded data, and outputting, when it is judged as a result of the check that there is an error in the embedded data, data for transmitting a resending request of the embedded data to the data transmission device.

20. A data embedding/extraction method for a communication device, comprising:

generating error detection data for embedded data;

embedding the embedded data and the error detection data in other data;

transmitting the other data to a data reception device through a network;

receiving data from a data transmission device through the network;

extracting embedded data and error detection data for the embedded data that are embedded in the received data;

checking whether there is an error in the embedded data or not by use of the embedded data and the error detection data;

outputting, when it is judged as a result of the check that there is no error in the embedded data, the embedded data, and outputting, when it is judged as a result of the check that there is an error in the embedded data, data for transmitting a resending request of the embedded data to the data transmission device; and

receiving the data for transmitting the resending request and embedding a predetermined resending request in other data in transmitted to the data reception device.